SEMICONDUCTOR ELECTRONICS

Total 25 marks

Question 1(½ + 1 + ½ + 1 = 3 marks)

a. Name one dopant which can be used with germanium to form an n-type semiconductor.

b. At what temperature would an intrinsic semiconductor behave like a perfect insulator? Explain.

c. What is the order of energy gap in a semiconductor.

d. What is doping?

Question 2 (½ x 4 = 2 marks)
Draw the circuit symbols for

a. Semiconductor diode
b. LED
c. Zener diode
d. Photo diode

Question 3 (1 mark)
What is a solar cell?

Question 4 (2 marks)
What happens to the width of the depletion layer of a p-n junction when it is (i) forward biased? (ii) reverse biased?

Question 5 (2 marks)
Draw IV characteristics of

a. Photo diode
b. Solar cell

Question 6 (2 marks)
What is avalanche breakdown. Show the IV characteristics.

Question 7 (2 marks)
Explain why a photodiode is usually operated under reverse bias?

Question 8 (3 mark)
Explain with the help of a diagram the formation of depletion region and barrier potential and barrier potential in a p-n junction?

Question 9 (1 + 2 = 3 marks)

a. What is rectification?

b. Draw a labelled diagram of a full wave rectifier. Draw the input and output waveforms.

Question 10 (2 + 3 = 5 marks)

a. Zener diodes have high dopant densities as compared to ordinary p-n junction diodes. How does it effect
   i. Width of the depletion layer
   ii. The junction electric field

b. Explain the use of zener diode as a voltage regulator with appropriate IV graphs.